



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/574,378

10/10/2006

Volker Geyer

30882/40939

2305

4743

7590

08/03/2010

MARSHALL, GERSTEIN & BORUN LLP
233 SOUTH WACKER DRIVE
6300 WILLIS TOWER
CHICAGO, IL 60606-6357

EXAMINER

BERDICHEVSKY, MIRIAM

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

08/03/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/574,378	Applicant(s) GEYER ET AL.	
	Examiner MIRIAM BERDICHEVSKY	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on restriction election 5/28/2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) 1-15,39 and 40 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16-38 and 41-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>4/3/2006, 6/12/2008, 12/3/2009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Claims 1-15 and 39-40 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected method of making a solar cell, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 5/28/2010.
2. Applicant's election with traverse of claims 16-38 and 41-44 in the reply filed on 5/28/2010 is acknowledged. The traversal is on the ground(s) that the common technical feature is that after covering the whole front and back surfaces with contact material cuts are made. This is not found persuasive because this technical feature is not common to among the groups. Further support for the lack of a special technical feature not known in the prior art is made clear through the rejection of Group II below. The Examiner notes that claim 43 was improperly placed in Group I as pointed out by Applicant. The Examiner apologizes and has added and examined claim 43 with group II below.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 16-39 and 41-44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Art Unit: 1795

5. Claim 16 recites the limitation "the row" in line 23. There is insufficient antecedent basis for this limitation in the claim. Claims 17-39 and 41-44 are rejected as dependent from claim 16.

6. Claims 34 and 43 recites the limitation "the width of the serial connection" in line 1. There is insufficient antecedent basis for this limitation in the claim. Until further clarification the Examiner will treat the limitation as referring to the distance between separation lines because the order of magnitude is similar.

7. Claim 16 describes that "the separation cuts penetrate the back contact layer all the to the support layer". This language is unclear. As the first separation cut is made in the front contact layer it would have to cut through both contact layers and through (not "to") the support layer. The Examiner believes Applicant intends this language for the "second contact layer" and will interpret the claims as such from herein.

8. Claims 25-26, 34 and 41-43 describe the distances as having "an order of magnitude of [a given range]". This language is unclear. The Examiner will give the claims the broadest reasonable interpretation. The term "order of magnitude" broadens the range, for example in claim 25 an order of magnitude of between 0.01mm (10micron) and 3mm will be interpreted as the tenths and ones (i.e. 0-10 mm not inclusive).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

Art Unit: 1795

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 16-21, 23-27, 29-30, 32-36, 38 and 41-43 are rejected under 35 U.S.C.

103(a) as being unpatentable over Nakata (EP 0940860), Probst (US 5626688) and

Levine (US 4407320).

As to claim 16, Nakata teaches a spherical solar cell comprising an insulating substrate core coated with a back contact layer and a CIS compound semiconductor ([0011], [0076] and [0077]). Nakata is silent to the particulars of the spherical solar cell materials when the solar cell has a CIS absorber layer and is therefore silent to the contact layer being Mo and a CdS buffer layer. Probst teaches a conventional CIS solar cell comprising a soda lime glass substrate (col. 5, line 5), a Mo back contact layer (col. 5, lines 10-15) with a CdS and a ZnO buffer layer (col. 8, lines 15-30). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the materials of Probst in making the spherical CIS solar cell with a Mo contact layer because Probst teaches an improved CIS solar cell (col. 5, lines 1-5) especially since it has been held to be within the skill of a worker to select a known material based on its suitability for the intended use (MPEP 2144). Nakata teaches that the spherical

Art Unit: 1795

semiconductors can be connected in the same manner seen in the prior art ([0077]) but Nakata and Probst remain silent to the particulars of spherical semiconductor arrangement and electrical connection on a larger scale. Levine teaches a device comprising an insulating support layer (101) in which conductive elements are incorporated in a pattern (111) wherein the conductive elements protrude from the surface of the support layer and the patterns define at least one separation line having width B (107s) (figure 1), a plurality of spherical semiconductor elements (110) protruding from the surface of the support layer and form a pattern in the areas next to the separation line (figure 1), a conductive front contact layer (103), a conductive back layer on the side opposite the first conductive layer (105), a first separation cut made in the front contact layer and a second separation cut made in the back contact layer which penetrates the back contact layer all the way through to the support layer, the separation cuts being on different sides of the row of conductive elements (figures 1 and 5: where 51 represents 103,105 and 52 represents 111 in an alternative embodiment). As a result of the combination, on the side of the support layer on which the back contact layer of the solar cell is arranged the semiconductor elements have back contacts in direct contact with the back contact layers of Levine. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the arrangement of Levine in modified Nakata to produce a series/parallel interconnected array of solar cells because Levine teaches that the structure provides a large area array converter utilizing minimum semiconductor material, flexibility without damage as

Art Unit: 1795

a thin sheet, short circuit tolerance and series interconnection during array manufacturing with very little additional cost, as taught by Levine (col. 1, lines 45-60).

Regarding claims 17-18, modified Nakata teaches that the support layer is a polyester, thermoplastic (Levine: col. 3, lines 15-16).

Regarding claim 19, the limitation is a product by process claim and is not given significant patentable weight because even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process (MPEP 2113).

Regarding claim 20, modified Nakata teaches a spherical conductive element (Levine: 111, figure 1).

Regarding claim 21, modified Nakata teaches that the conductive material is a solid (Levine: col. 3, lines 19-21).

Regarding claim 23, modified Nakata teaches a TCO layer as part of the semiconductor element (Probst: col. 8, lines 20-30).

Regarding claim 24, modified Nakata teaches that the separation line of conductive elements is essentially straight and extends between two edges of the support layer opposite from one another (Levine: figures 1 and 5).

Regarding claims 25 and 41, modified Nakata is silent to the specific dimensions of the interconnection (separation line) and is therefore silent the limitations requiring a

Art Unit: 1795

width of the separation line to be of a certain magnitude of ranges. The dimensions of a conducting element (interconnection/separation line) are result effective variables. It is well known that resistance is dependent on length such that resistance increases with length (in this case termed width) between connected elements. One of ordinary skill in the art at the time of the invention would have found it obvious to optimize the width of the separation line by trying different widths with a reasonable expectation of success of similar results (MPEP 2144 and 2141).

Regarding claims 26, 34 and 42-43, modified Nakata is silent to the specific dimensions of the interconnection (separation line) and is therefore silent the limitations requiring a distance between separation lines of a certain magnitude of ranges. The distance between separation lines or the distance containing semiconductor conversion elements is a result effective variable and a design choice. As the distance available for electrical conversion increases output increases however material costs increase. It would have been obvious to one of ordinary skill in the art at the time to optimize the amount of area dedicated to conversion depending on out required for a specific job and funds/materials available by trying different distances between separation lines with a reasonable expectation of similar results (MPEP 2144 and 2141).

Regarding claim 27, modified Nakata teaches that the front contact layer comprises a conductive material (Levine: col. 43, lines 15-20).

Regarding claim 29, modified Nakata teaches that the back contact layer is metal (col. 3, lines 5-10).

Regarding claim 30, modified Nakata teaches that the back contact layer is aluminum (col. 4, lines 50-55).

Regarding claim 32, modified Nakata teaches that the separation cuts are filled with insulating material (Levine: figure 5).

Regarding claim 33, modified Nakata teaches that the serial connection is strip-like (Levine: figures 1 and 5).

Regarding claim 35, modified Nakata teaches that the serial connection is joined in such a way that the back contact layer is in contact with a front contact layer of the other serial connection (Levine: figure 5).

Regarding claim 36, modified Nakata teaches that the serial connection is joined to at least another serial connection in shingle like configuration, whereby the front contact layer lies on a back contact layer of the other serial connection (Levine: figure 5).

Regarding claim 38, modified Nakata teaches a photovoltaic module (Levine: title).

12. Claims 22 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakata, Probst and Levine as applied to claims 21 and 27 respectively above and further in view of Yoshikawa (US 6586670).

Regarding claims 22 and 28, modified Nakata is silent to the conductive element being copper (claim 22) and the front contact layer being a TCO (claim 28). Yoshikawa teaches that aluminum (used throughout Nakata as electrically conductive material), copper and TCOs are art recognized equivalent conductive materials in the solar arts. It

Art Unit: 1795

would have been obvious to one of ordinary skill to try using copper and TCOs as conductive components of modified Nakata with a reasonable expectation of success and similar results (MPEP 2141) especially since it has been held to be within the skill of a worker in the art to select a known material based on its suitability for an intended use (MPEP 2144).

13. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakata, Probst and Levine as applied to claim 30 above and further in view of Hogel (US 4913744).

Regarding claim 31, modified Nakata is silent to the back contact layer being an intrinsic conductive polymer. Hogen teaches that aluminum (used throughout Nakata as electrically conductive material) and intrinsic conductive polymers are art recognized equivalent conductive materials in the solar arts (col. 8, lines 40-55). It would have been obvious to one of ordinary skill to try using an intrinsic conductive polymer as the back conductive layer in modified Nakata with a reasonable expectation of success and similar results (MPEP 2141) especially since it has been held to be within the skill of a worker in the art to select a known material based on its suitability for an intended use (MPEP 2144).

14. Claims 37 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakata, Probst and Levine as applied to claims 35 and 36 respectively above and further in view of Tsuzuki (US 5679176).

Regarding claims 37 and 44, modified Nakata is silent to a conductive adhesive connecting the front and back conductive layers in the serial connection. Tsuzuki

Art Unit: 1795

teaches the use of a conductive adhesive (solder) for creating the serial connection between conductive layers (upper/lower electrodes) of solar devices (col. 3, lines 45-55). It would have been obvious to one of ordinary skill in the art at the time of the invention to connect the conductive layers of modified Nakata using a conductive adhesive when forming the serial connection because the method allows for on site adaptability by connecting separate parts rather than preformed modules.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **MIRIAM BERDICHEVSKY** whose telephone number is (571)270-5256. The examiner can normally be reached on M-Th, 10am-8pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 10/574,378
Art Unit: 1795

Page 11

/M. B./
Examiner, Art Unit 1795

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795